Investigations on the neutron induced reaction cross sections in the 8-12 MeV problem range

Julius Csikai[1], Rita Doczi[1], Andras Fenyvesi[2]

[1] *Institute of Experimental Physics Debrecen University, and Institute of Nuclear Research of the Hungarian Academy of Sciences,Hungary*
[2] *Institute of Nuclear Research of the Hungarian Academy of Sciences,Hungary*

A fast pneumatic rabbit system developed at the MGC-20 variable energy cyclotron of ATOMKI rendered the measurements of cross section curves for neutron induced reactions in the 7-12 MeV range even for short-lived residual nuclei possible. Special attention was paid for the following reactions: ^{19}F(n,p)^{19}O, ^{26}Mg(n,α)^{23}Ne, ^{31}P(n,α)^{28}Al, ^{50}Ti(n,p)^{50}Sc, ^{54}Cr(n,p)^{54}V, ^{62}Ni(n,p)^{62}Co, and ^{208}Pb(n,p)^{208}Tl. In addition, systematic study was carried out on the excitation functions of (n,2n), (n,n'γ) and (n,p) reactions for different Pb isotopes. Standard data for the normalizations of these excitation functions were also measured at around 14 MeV neutron energy using the D-T generator of the IEP. For the determination of the cross sections the activation method was applied using high energy resolution gamma spectrometers, gas flow and end-window beta-counters. These investigations were undertaken with the aim to obtain new and precise data needed in various fields of science and technology e.g. for the improvement of neutron data libraries, nuclear model calculations, the CTR program, ADE systems, neutron methods for non-intrusive inspections.

This work was supported in part by the Hungarian Research Fund (OTKA T037190, D35480), the International Atomic Energy Agency, Vienna (Contract No. 10886/R2) and the EURATOM, Geel (Contract No. IRMM/ST/2001-248"14-CCR 478519).

Email: csikai@delfin.klte.hu